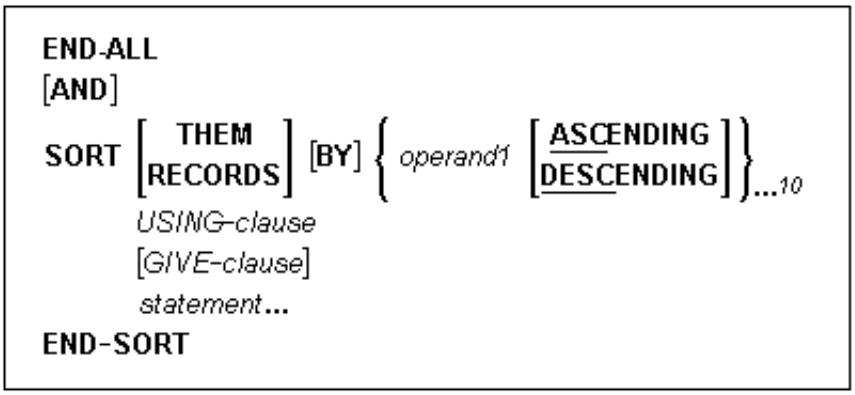
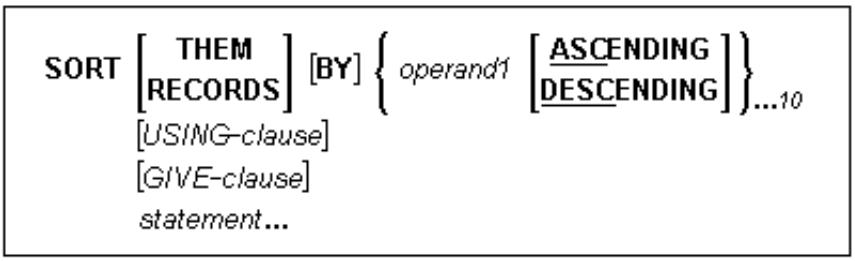
SORT

Structured Mode Syntax



* If a statement label is specified, it must be placed *before* the keyword SORT, but *after* END-ALL (and AND).

Reporting Mode Syntax



Operand	Possible Structure					Possible Formats												Referencing Permitted	Dynamic Definition
Operand1		S				A	N	P	I	F	B	D	T					no	no

Related Statement: FIND with SORTED BY option

Function

The SORT statement is used to perform a sort operation, sorting the records from all processing loops that are active when the SORT statement is executed.

For the sort operation, Natural’s internal sort program is used. On mainframe computers, it is also possible to use another, external sort program. The sort program to be used is determined by the Natural administrator in the macro NTSORT of the Natural parameter module (see also the Natural Operations for Mainframes documentation).

For the use of an external sort program, additional JCL is required; ask your Natural administrator for additional information.

Note:
Under OpenVMS and UNIX, the records that are to be sorted will be stored intermediately in the directory as specified under "TMP_PATH" in the configuration file "Natural.INI".

Restrictions

The SORT statement must be contained in the same object as the processing loops whose records it sorts.

Nested SORT statements are not allowed.

On mainframe computers, the total length of a record to be sorted must not exceed 10240 bytes.

Processing Loops

In reporting mode, the SORT statement closes all active processing loops and initiates a new processing loop.

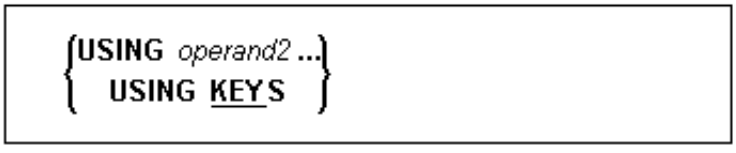
In structured mode, the SORT statement must be preceded by END-ALL, which serves to close all active processing loops. The SORT statement itself initiates a new processing loop, which must be closed with END-SORT.

Sort Criteria - operand1

Operand1 represents the fields/variables to be used as the sort criteria. 1 to 10 database fields (descriptors and non-descriptors) and/or user-defined variables may be specified. A multiple-value field or a field contained within a periodic group may be used. A group or an array is not permitted.

The default sort sequence is ASCENDING. If you wish the values to be sorted in descending sequence, specify DESCENDING. ASCENDING/DESCENDING may be specified for each sort field.

USING-clause



Operand	Possible Structure					Possible Formats												Referencing Permitted	Dynamic Definition
Operand2		S	A			A	N	P	I	F	B	D	T	L	C			no	no

The USING clause indicates the fields which are to be written to intermediate sort storage. It is required in structured mode and optional in reporting mode. However, it is strongly recommended to also use it in reporting mode so as to reduce memory requirements.

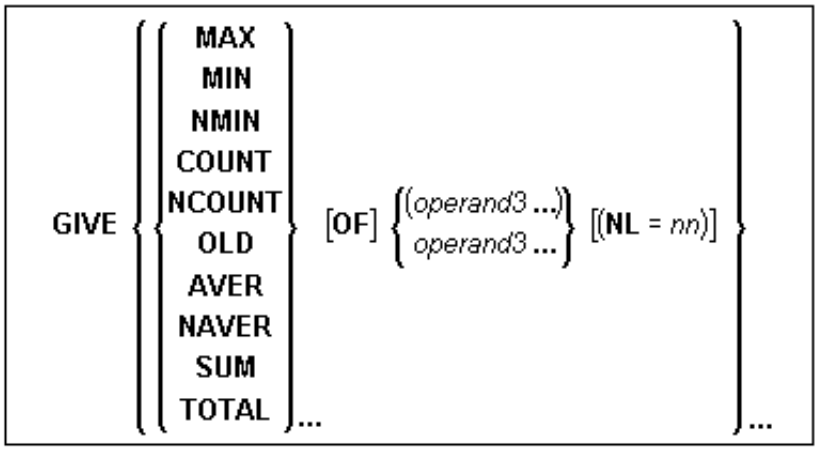
If you specify USING KEYS, only the sort key fields, as specified with *operand1*, will be written to intermediate sort storage.

With USING *operand2* you can specify additional fields that are to be written to intermediate sort storage - in addition to the sort key fields (as specified with *operand1*).

If you omit the USING clause in reporting mode, all database fields of processing loops initiated before the SORT statement, as well as all user-defined variables defined before the SORT statement, will be written to intermediate sort storage.

If, after sort execution, a reference is made to a field which was not written to sort intermediate storage, the value for the field will be the last value of the field before the sort.

GIVE-clause



Operand	Possible Structure					Possible Formats											Referencing Permitted	Dynamic Definition
Operand3		S	A			*											yes	no

* depends on function

The GIVE clause is used to specify Natural system functions (MAX, MIN, etc.) that are to be evaluated in the first phase of the SORT statement. These system functions may be referenced in the third phase (see SORT Statement Processing). A reference to a system function after the SORT statement must be preceded by an asterisk, for example, *AVER (SALARY).

For details on the individual system functions, see the Natural Reference documentation.

(NL=nn)

This option may be used to prevent an arithmetic overflow during the evaluation of system functions; it is described under Arithmetic Overflows in AVER, NAVER, SUM or TOTAL in the section System Functions of the Natural Reference documentation.

This option applies to AVER, NAVER, SUM and TOTAL only and will be ignored for any other system function.

SORT Statement Processing

A program containing a SORT statement is executed in three phases.

1st Phase - Selecting the Records to be Sorted

The statements before the SORT statement are executed. Data as described in the USING clause will be written to intermediate sort storage.

In reporting mode, any variables to be used as accumulators following the sort must not be defined before the SORT statement. In structured mode, they must not be included in the USING clause. Fields written to intermediate sort storage cannot be used as accumulators because they are read back with each individual record during the 3rd processing phase. Consequently, the accumulation function would not produce the desired result because with each record the field would be overwritten with the value for that individual record.

The number of records written to intermediate storage is determined by the number of processing loops and the number of records processed per loop. One record on the internal intermediate storage is created each time the SORT statement is encountered in a processing loop.
In the case of nested loops, a record is only written to intermediate storage if the inner loop is executed. If in the example below a record is to be written to intermediate storage even if no records are found for the inner (FIND) loop, the FIND statement must contain an IF NO RECORDS FOUND clause.

```
READ ...
  ...
  FIND ...
...
END-ALL
SORT ...
  DISPLAY ...
END-SORT
...
```

2nd Phase - Sorting the Records

The records are sorted.

3rd Phase -Processing the Sorted Records

The statements after the SORT statement are executed for all records on the intermediate storage in the specified sorting sequence.
Database fields to be referenced after a SORT statement must be correctly referenced using the appropriate statement label or reference number.

Example


```
/* EXAMPLE 'SRTEX1R': SORT (REPORTING MODE)
/************************************************************
LIMIT 3
FIND EMPLOYEES WITH CITY = 'BOSTON'
OBTAIN SALARY(1:2)
COMPUTE #TOTAL-SALARY (P11) = SALARY (1) + SALARY (2)
ACCEPT IF #TOTAL-SALARY GT 0
/************************************************************
SORT BY PERSONNEL-ID USING #TOTAL-SALARY SALARY(*) CURR-CODE
     GIVE AVER(#TOTAL-SALARY)
/************************************************************
AT START OF DATA
 DO
  WRITE NOTITLE
        '*' (40)
        'AVG CUMULATIVE SALARY:' *AVER (#TOTAL-SALARY) /
  MOVE *AVER (#TOTAL-SALARY) TO #AVG (P11)
 DOEND
COMPUTE #AVER-PERCENT (N3.2) = #TOTAL-SALARY / #AVG * 100
ADD #TOTAL-SALARY TO #TOTAL-TOTAL (P11)
DISPLAY NOTITLE PERSONNEL-ID SALARY (1) SALARY (2)
                #TOTAL-SALARY CURR-CODE (1)
                'PERCENT/OF/AVER' #AVER-PERCENT
AT END OF DATA
 WRITE / '*' (40) 'TOTAL SALARIES PAID: ' #TOTAL-TOTAL
/************************************************************
END
```

```
PERSONNEL   ANNUAL     ANNUAL   #TOTAL-SALARY CURRENCY PERCENT
     ID       SALARY     SALARY                    CODE     OF
                                                          AVER
  --------- ---------- ---------- ------------- -------- -------

  ************************************* AVG CUMULATIVE SALARY:        41900

  20007000       16000      15200        31200  USD        74.00
  20019200       18000      17100        35100  USD        83.00
  20020000       30500      28900        59400  USD       141.00

  ************************************* TOTAL SALARIES PAID:        125700
```

The previous example is executed as follows:

First Phase:

- Records with CITY=BOSTON are selected from the EMPLOYEES file.
- The first 2 occurrences of SALARY are accumulated in the field #TOTAL-SALARY.
- Only records with #TOTAL-SALARY greater than 0 are accepted.
- The records are written to the sort intermediate storage. The database arrays SALARY (first 2 occurrences) and CURR-CODE (first occurrence), the database field PERSONNEL-ID, and the user-defined variable #TOTAL-SALARY are written to the intermediate storage.
- The average of #TOTAL-SALARY is evaluated.

Second Phase:

- The records are sorted.

Third Phase:

- The sorted intermediate storage is read.
- At the at-start-of-data condition, the average of #TOTAL-SALARY is displayed.
- #TOTAL-SALARY is added to #TOTAL-TOTAL and the fields PERSONNEL-ID, SALARY(1), SALARY(2), #AVER-PERCENT and #TOTAL-SALARY are displayed.
- At the end-of-data condition, the variable #TOTAL-TOTAL is written.

